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ABSTRACT

This training outline for front end loader operators, one in a series of eight outlines, is designed primarily for company training foremen or supervisors and for trainers to use as an industry-wide guideline for heavy equipment operator training in open pit mining in British Columbia. Intended as a guide for preparation of lesson plans both for classroom and on-the-job training activities, this outline is divided into eight modules. Each module is based on 3 to 14 objectives. For each objective, key points and procedures are outlined. Module topics are basic safety and operating rules, communications, gauges and controls, pre-start and operational checks, basic operation, front end loader production operation, service and refuel, and special assignments. A skill profile chart is attached. (YLB)

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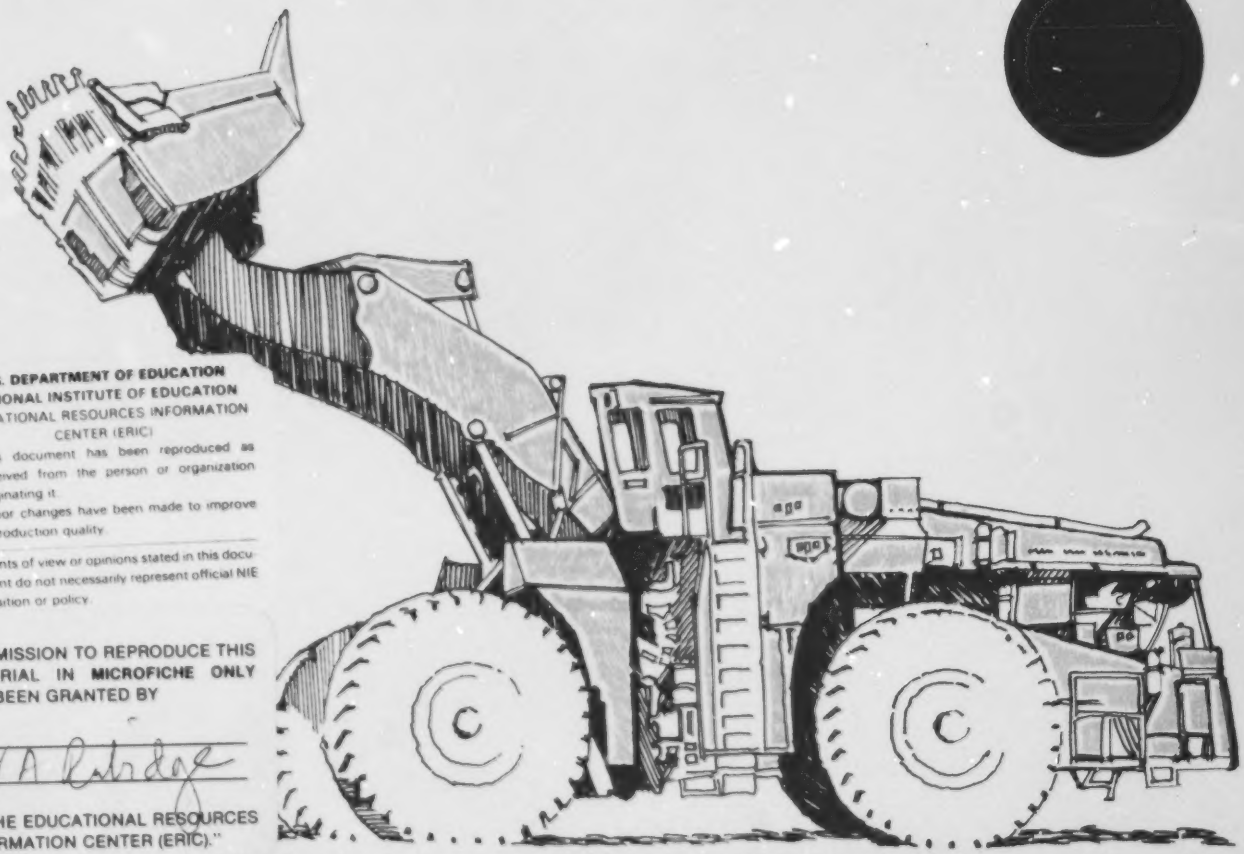
OPEN PIT MINING JOB TRAINING SERIES

FRONT END LOADER



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Titles in the Open Pit Mining Job Training Series

- Haulage Truck Operator
- Rubber Tire Dozer Operator
- Track Dozer Operator
- Front End Loader Operator
- Grader Operator
- Rotary Drill Operator
- Shovel Operator
- Heavy Duty Tireman

OPEN PIT MINING
JOB TRAINING SERIES
FRONT END LOADER OPERATOR

A joint project
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and
member companies of the
Mining Association of British Columbia

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INTRODUCTION

The *Open Pit Mining Job Training Series* was developed through the co-operation of member companies of the Mining Association of British Columbia and the Post-Secondary Department of the Ministry of Education. The series was initiated by the education and training committee of the Mining Association. The committee chairman, Les Redford, has given invaluable support throughout the project.

The training outlines in the series are primarily written for company training foremen or supervisors and for trainers to serve as an industry-wide guideline for heavy equipment operator training in open pit mining in British Columbia.

THE DEVELOPMENT PROCESS

DACUM

Each of the training outlines in the series was developed using the DACUM process, a systematic model for developing modular training programs. A series of four booklets describing the DACUM process is available from:

Publication Services Branch,
Ministry of Education,
878 Viewfield Road,
Esquimalt, B.C.
V9A 4V1
Telephone: (604) 387-5331

Project Initiation

The Mining Association's education and training committee gave early direction to the project. Committee members actively working with chairman Les Redford were:

Bill Scribner, Brenda Mines Limited

Bill Dement, Craigmont Mines Limited

Tom Nicholson, Mining Association of British Columbia

Glen Martin, Similkameen Division, Newmont Mines Limited

Vic Dawson of the Ministry of Energy, Mines and Petroleum Resources also participated with the committee in setting directions.

The first workshop with representatives from the mining industry, the Mining Association, and the Ministry of Education was held in April, 1979. Project goals and priorities were set and an activity plan was established.

DACUM Workshop and Skill Profile Charts

A three day DACUM workshop was held in June 1979. This workshop was conducted by Diane Morrison, a program developer from the Ministry of Education. The following representatives participated in the workshop:

Fred Mason, Afton Mines Limited

Ivan Moser, Afton Mines Limited

Bill Savilow, B.C. Coal Ltd.

Vern Bouck, Bethlehem Copper Corporation

Ray Chenier, Bethlehem Copper Corporation

Bill Scribner, Brenda Mines Limited

Ron Owens, Cyprus Anvil Mining Corporation

Dennis LeDuc, Endako Mines Division, Placer Development Limited

Terry Perrier, Fording Coal Limited

Barry Tripp, Granisle Mine, Noranda Mines Limited

Tom Nicholson, Mining Association of British Columbia

Fred Savage, Ministry of Education

Jack Murray, Noranda Mines Limited

Ed Rudolph, Noranda Mines Limited

Don Rankin, Similkameen Division, Newmont Mines Limited

Don Barker, Zapata Granby Limited

The DACUM workshop produced heavy equipment operator skill profile charts. Each chart listed the essential skills needed by the operator on the job. During the following months, the skill profile charts were circulated to representatives throughout the mining industry for validation.

Training Outlines

Once the skill profile charts were approved, the next step was to write training outlines. For each skill on the charts, one or more objectives were written that state what the trainee must be able to perform at the end of the training program to demonstrate mastering the skill. A trainee who can do all the objectives in the outlines is considered to have the skills required to perform on the job. A training outline developed using this approach is often referred to as a performance or competency-based outline.

Bill Savilow from B.C. Coal Ltd. (formerly Kaiser Resources) was selected to write six training outlines from the skill profile charts. He worked part-time on the outlines while continuing his responsibilites in the training department at B.C. Coal. Bill wrote the *Haulage Truck Operator, Rubber Tire Dozer Operator, Track Dozer Operator, Front End Loader Operator, Grader Operator* and *Rotary Drill Operator* outlines during 1980 and 1981.

Don McColman of Newmont Mines wrote *Heavy Duty Tireman,* and Larry Hartley of Utah Mines wrote *Shovel Operator.*

Bruce Kurschenska of B.C. Coal Ltd. supplied the photographs upon which the cover illustrations are based.

Reviewing the Training Outlines

Throughout 1980 and 1981 a series of workshops were held to review the outlines. The workshops were conducted by Diane Morrison and attended by participants from various mining companies. The participants who played an extremely important role in examining and revising the training outlines to reflect training standards required across the industry were:

Hans Geertsema, Afton Mines Limited

Fred Mason, Afton Mines Limited

Bill Savilow, B.C. Coal Ltd.

Vern Bouck, Bethlehem Copper Corporation

Jerry LeBlanc, Bethlehem Copper Corporation

Don Miller, Brenda Mines Limited

Gerry Cooper, Brinco Mining Limited

Richard Schwengler, Equity Silver Mines Limited

Don Fraser, Cyprus Anvil Mining Corporation

Terry Wozniak, Fording Coal Limited

Norm Myhre, Gibraltar Mines Limited

George Sutherland, Highmont Operating Corporation

Fred Savage, Ministry of Education
Don McColman, Newmont Mines Limited
John Graham, Noranda Mines Limited
Charles Heikkila, Noranda Mines Limited
Les Redord, Noranda Mines Limited
Dennis LeDuc, Placer Development Limited
Larry Hartley, Utah Mines Limited

Field-testing the Haulage Truck Operator Outline

In June 1980 three companies (B.C. Coal Ltd; Noranda Mines Limited, Granisle Mine; Brinco Mining Limited) offered to field-test the new *Haulage Truck Operator* outline for a six month period and report back to the group. During the fall, it was further agreed that the other participating mines in the project would also field-test the outline and would complete a questionnaire. In the winter of 1981 all mines reported that the outline had been used successfully to improve the truck operator training at their mine and some reported making major revisions of their training programs as a result of the outline.

USE OF TRAINING OUTLINES

Additions and Modifications

References are made in the outlines to areas where policies will vary from company to company and it is up to trainers to insert their company policies in these places.

Each training outline is based on a specific manufacturer and model of equipment, for example the front end loader is a L-800 Letourneau. In order to use the material for a different manufacturer or model, a trainer must review the outline and make necessary modifications. It is anticipated that only the section on gauges and controls will need major changes.

For Lesson Plans

The outlines do not contain lesson plans. Rather the trainer should use the outlines as a guide when preparing lesson plans both for classroom and on-the-job training activities. Trainers are encouraged to expand upon the outlines to suit their own situation.

For Testing

The outline should also be used as a guideline for written, oral, and practical testing. Trainers should ensure that upon completion of training, each trainee can perform every objective listed in the outline. It will take time and experience on-the-job before a trainee becomes a proficient operator. Regular on-the-job monitoring by supervisors and trainers can greatly assist the trainee in developing and maintaining the skills needed to be a heavy equipment operator.

Sample tests for the outlines have been written and are available to trainers from:

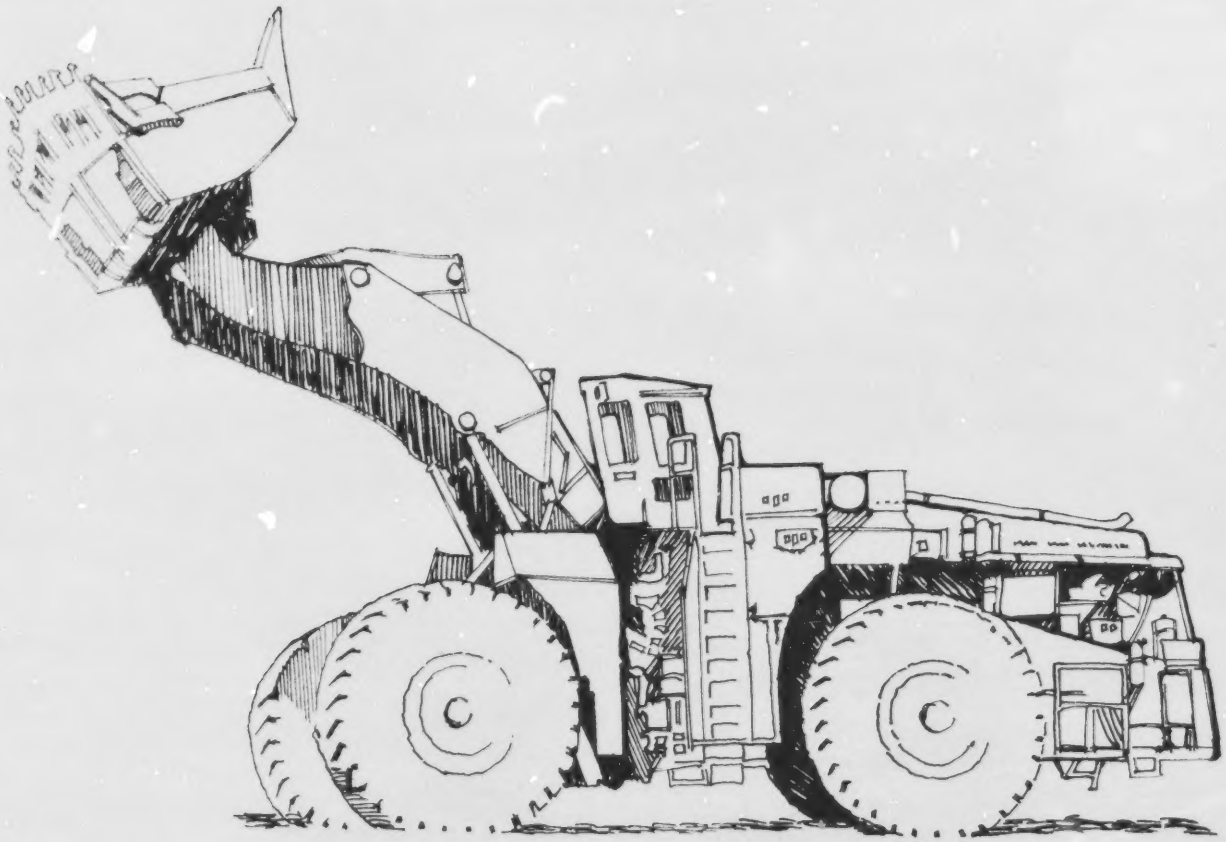
Research & Curriculum Development Branch,
Ministry of Education,
7451 Elmbridge Way,
Richmond, B.C.
V6X 1B8
Telephone: (604) 278-3433

For Trainees

The outlines provide valuable information on operating heavy equipment and give clear statements on what trainees must be able to do by the end of their training. Therefore, it is recommended that trainees be given a copy of both the skill profile chart and the outline.

BASIC SAFETY AND OPERATING RULES

module 1



OBJECTIVE 1-1

The front end loader operator will explain how safety and operating rules set by the company and the *Mines Regulation Act* protect the operator and fellow workers on the mine site.

KEYPOINTS/PROCEDURES

1. The following are basic safety and equipment operating rules. Individual companies should incorporate their own safety rules into this material.

2. **Personal wear**

   The safety rules concerning personal wear are set for the protection of the front end loader operator and include proper:

   - Hard hats
   - Footwear
   - Eye protection
   - Hearing protection
   - Gloves

3. **Personal conduct**

   Rules concerning personal conduct are enforced for the safety of all personnel on the mine site and cover:

   - Horseplay.
   - Reading on the job.
   - Alcohol and drugs.

4. **Pre-start check**

   Safety rules ensure personal protection while conducting pre-start checks and also ensure that the front end loader is in a safe operating condition before it is put into production. Special caution is required when:

   - Working around moving components on the front end loader such as fans and belts.
   - Removing radiator caps.
   - Climbing on or off of the front end loader.

   It is essential to report immediately any operational problems with the brakes or steering. The front end loader must always be equipped with a fire extinguisher.

   Rules 263 (d) and 263 (e) of the *Mines Regulation Act* and rules 195 (d) and 195 (e) of the *Coal Mines Regulation Act* state:

   > (d) The driver or operator of any vehicle or mobile equipment shall examine and test his equipment at the beginning of each shift before putting it into use; and if any unsafe condition is noted, such equipment shall not be used and the immediate supervisor shall be notified.
   >
   > (e) For each vehicle or piece of mobile equipment, a logbook or other suitable record shall be maintained, in which shall be entered a record of all unsafe conditions and the repairs made, and all notations shall be signed by the person making the entry, and the logbook or records shall be available for inspection at all times.

   It is the front end loader operator's responsibility to comply with these rules.

5. Operating

Operating rules ensure the safety of the front end loader operator and of all other persons on the mine site.

Only persons authorized by the company are allowed to operate front end loaders.

There are blind areas immediately surrounding the front end loader. Before moving the front end loader, inspect the area, on foot in the yard or visually in the pit. Rule 264 (a) (iii) of the *Mines Regulation Act* and rule 196 (a) (iii) of the *Coal Mines Regulation Act* state:

> No person shall operate or put in motion any vehicle or mobile equipment unless he has just previously inspected on foot the area over which the equipment is to be moved.

The front end loader operator must immediately follow all warning signals given by others on the mine site including horns, lights and hand signals. These signals are covered in OBJECTIVE 2-1.

6. Traffic control scheme

It is the front end loader operator's responsibility to obey the traffic control scheme as set out by the company (OBJECTIVE 1-4).

Rules 264 (b) of the *Mines Regulation Act* and 196 (b) of the *Coal Mines Regulation Act* both state:

> The owner, agent, or manager of every mine shall prepare a traffic control scheme for his operation and shall have it accepted by the Inspector, and the scheme shall show the maximum allowable speeds for the vehicles in use, rules of passing, "stop" and "yield" locations, priority rules for various vehicles, rules for night operation, maximum operating grades, emergency run-off protection and such other information as may be required by the Inspector.

7. Servicing

Servicing rules ensure the safety of all persons in the service area. The front end loader operator must take the following precautions:

- Never smoke or strike an open light while fuelling.
- Always clear the area of people before moving the front end loader in or out of the service area.
- Add oil or grease only when the front end loader engine is shut off.
- Remove the radiator cap only when the engine is cold.
- Lower the bucket to the ground slowly. Do not let it drop.

Servicing procedures are covered in Module 7.

8. Parking

Safe parking procedures are established to provide safety for the people working around the front end loader. The operator must obey the following procedures for leaving the front end loader:

a. Park on safe and level ground.

b. Lower the bucket to the ground, applying slight down pressure.

c. Set the brakes.
d. Engage the park brake.
e. Place the directional control into neutral.
f. Move the idle switch from high to low position on the Letourneau.
g. Allow a cooling down period of at least five minutes for the engine.
h. Shut off the engine and turn off the starter key.

OBJECTIVE 1-2

The front end loader operator will explain the importance of reporting accidents and injuries.

KEYPOINTS/PROCEDURES

1. **Accidents**

   All accidents must be reported to the supervisor as soon as possible. In the event of a serious accident, do not disturb the accident scene unless there is a risk of further damage or a danger to personnel.

2. **Injuries**

   All injuries, no matter how slight, must be reported to the supervisor and to the first aid station. Any injury where the skin is broken must be treated to avoid infection. In cases of serious injury, do not move the victim — send for the first aid attendant.

3. **Investigations**

   Reporting accidents and injuries makes way for an investigation to be carried out to determine the cause. These investigations often lead to new rules or procedures that create a safer working environment for all employees.

   Note:

   It is the responsibility of all employees to report any hazardous act or condition to their supervisors immediately.

OBJECTIVE 1-3

The front end loader operator will describe the changing conditions that can occur at the mine site and explain the importance of staying alert to these changes.

KEYPOINTS/PROCEDURES

1. **Weather**

   Rain, snow and fog each have an effect on the operator's visibility. Additional caution is required while operating under poor weather conditions.

2. **Road conditions**

   Road conditions change with the changing weather, e.g., slippery conditions in cold weather and dusty conditions when it's hot. The operator must stay alert, as the front end loader has a tendency to slide under icy conditions.

3. **Other equipment**

   The front end loader operator must be alert at all times to other equipment working or travelling in the area.

4. **Traffic control scheme**

   While trucks are being loaded at the work face, the traffic control scheme is constantly changing and the front end loader operator must be aware of the changes. Use extreme caution during all loading procedures.

5. **Working conditions**

   Working conditions are constantly changing at the work face. The front end loader operator must watch for the movement of equipment and the sloughing or rolling down of material from the face.

6. **Performance**

   An alert operator can determine a change in the front end loader's performance by sound and by comparing how the front end loader reacts under normal working conditions. For example, the loss of power on the front end loader can be sensed immediately by the operator.

7. **Light**

   The change from daylight to darkness and vice-versa creates operating conditions that demand added attention and alertness.

OBJECTIVE 1-4

The front end loader operator will describe the traffic control scheme at the mine site for the haulage roads, the loading area and the dumping area.

KEYPOINTS/PROCEDURES

1. **Right of way**

   The right of way priority system can change from property to property. An example of a right of way priority system is:

   a. Ambulance, rescue or fire trucks.

   b. Buses.

   c. Road maintenance equipment.

   d. Loaded production trucks.

   e. Empty production trucks.

   f. Explosive trucks and fuel trucks.

   g. All other trucks or equipment (including graders doing work other than road maintenance).

   Caution:

   A set of right of ways provides guidelines, but all operators must use judgement in all circumstances. Remember, a right of way can only be given, it cannot be taken.

2. **Traffic scheme**

   At all times the front end loader operator must follow the traffic control system established by the company unless directed to do otherwise by the supervisor. The front end loader should yield to faster moving equipment.

3. **Traffic signs**

   Obey traffic signals and signs including stop signs or yield signs and lights at the breaker station or crusher. If a red light appears at the crusher hopper, do not dump material into the hopper.

4. **Merging traffic**

   Merging traffic must yield to through traffic unless otherwise informed by the supervisor.

5. **Changing road systems**

   When road systems change, operators must be forewarned and also advised as to which traffic has the right of way. Front end loader operators should always yield to faster moving equipment.

6. **Parking**

   Front end loaders should be parked on a safe and level area. Never park within 50 feet of the work face or within the company's established distance for other equipment. Follow these procedures for parking:

   a. Lower the bucket to the ground and apply slight pressure.

   b. Set the park brake.

   c. Put the directional control lever into neutral.

   d. After a cooling down period of five minutes, shut off the engine.

OBJECTIVE 1-5

The front end loader operator will explain the importance of avoiding tire damage and the procedures to prevent the damage.

KEYPOINTS/PROCEDURES

1. **Road hazards**

   The front end loader operator must constantly be alert to spill rock off of trucks, metal objects and potholes. The operator, while travelling, should push or pick up with the bucket foreign material from the road and repair potholes by digging and replacing the material.

2. **Work face area**

   In the work face area, the front end loader operator should be alert to spill rock from haulage trucks and front end loader buckets. The loose material must be either pushed or picked up and put into the face for the front end loader to load out.

   Caution:

   Use extreme caution in water filled areas to avoid tire damage as water is a lubricant for rubber and tires cut more easily. If a tire is flat or low, do not move the loader. Park it immediately.

OBJECTIVE 1-6

The front end loader operator will explain the normal braking techniques for the loader.

KEYPOINTS/PROCEDURES

1. For normal braking the front end loader operator should:
   a. Reduce the engine speed by letting off the pressure on the accelerator pedal. As soon as pressure is let up on the accelerator, the dynamic brakes automatically engage.
   b. Press down on the hill-hold pedal to increase the dynamic braking.
   c. Once the loader has stopped, keep full pressure on the hill-hold pedal to hold the loader stationary.
   d. Place the directional control lever into the neutral position.
   e. Apply the park brakes.
   f. Lower the bucket to the ground and apply slight down pressure.
   g. Move the high/low idle switch to the low idle position.
   h. After a five minute cooling period, shut off the engine.

OBJECTIVE 1-7

The front end loader operator will describe the emergency steering and braking procedures.

KEYPOINTS/PROCEDURES

1. The front end loader is equipped with an automatic system that allows the emergency steering pump to automatically kick in when the steering pressure drops below a predetermined point. The emergency steering pump only works while the loader is in high idle. Keep the high low idle switch in the high position until the loader comes to a complete stop.
2. For emergency braking the front end loader operator should:
   a. Reduce the engine speed by releasing the pressure on the accelerator. The dynamic braking comes on automatically.
   b. Push down as hard as possible with the other foot on the service brake pedal.
   c. Push down on the hill-hold pedal as hard as possible.
   d. Lower the bucket to the ground and apply pressure. Never tilt the bucket forward.
   e. Steer the front end loader to the closest safe and convenient area.
   f. After the front end loader is stopped, use standard parking procedures.
   g. Report the situation to the supervisor.
   h. Look for the problem.

OBJECTIVE 1-8

The front end loader operator will explain why it is important to maintain good housekeeping practices.

KEYPOINTS/PROCEDURES

1. The importance of good housekeeping is to maintain a safe and pleasant environment to work in. Employees have the responsibility to keep their work area in good condition. Good housekeeping is an essential part of each employee's job. A disorderly and dirty work area can cause accidents, personal injuries and low morale. Good housekeeping on the front end loader is essential for safety and includes keeping:

   - All windows and mirrors clean for good visibility.
   - The dash clean, primarily the gauges and indicators so that they can be accurately read.
   - The cab clean of all paper, rags, dirt, mud and aerosol cans.

   Caution:

   Aerosol cans can cause serious injuries by exploding.

OBJECTIVE 1-9

The front end loader operator will explain the mine site blasting and guarding procedures.

KEYPOINTS/PROCEDURES

1. The blasting procedure is enacted on the day of the blast. Employees should be notified of the blast, although this notification is not the final precaution. Before blasting, the supervisor makes a careful physical check of the area to ensure that no one is there. All employees are evacuated to a safe distance. All access roads are carefully guarded to prevent access into the blast area.
2. The guards have the authority to stop anyone from entering the blast area. Guards are visibly identifiable by a colored vest issued by supervision. They remain at the location designated by supervision, until relieved by the general foreman or by the person who designated them as guards.
3. Should any irregularities occur, it is the guard's responsibility to immediately notify the supervisor of the problem.
4. It may be necessary for the front end loader operator to be used as a guard, but very unlikely. Operators acting as guards must be on the ground and not sitting in the cab in order to stop all traffic from entering the blast area.

OBJECTIVE 1-10

Given a map of the pit area layout, the front end loader operator will give the proper names of the pits and haul roads and will locate the dump areas by name or number. The dump areas include waste dumps, stockpiles and breaker station or crusher station locations.

KEYPOINTS/PROCEDURES

1. Each property is different in layout, and in the names and numbers of the dumps, pits, etc.
2. Besides knowing the basic layout of the pit area, some properties may also want employees to know the shovel locations.

OBJECTIVE 1-11

The front end loader operator will explain and demonstrate the proper use of fire suppression systems and fire extinguishers.

KEYPOINTS/PROCEDURES

1. **Fire extinguishers**

   All front end loaders are equipped with a hand fire extinguisher. Shut down the engine before using the fire extinguisher. Aim the dry chemical flow at the base of the fire and move the flow from side to side. The side to side action forces the flames away from the source and has a cooling effect. The chemical cuts off the oxygen at the source of the flame and puts out the fire.

2. **Fire suppression systems**

   The fire suppression system consists of dry chemical tanks mounted on the front end loader with a pressure source to distribute the chemical powder. Hoses run from the tanks to nozzles at all critical areas of the loader. The operator manually pulls a button that releases the pressure sources and the chemical is spread. This can be performed either from the cab or from the ground.

3. Speed is the important factor in combating a front end loader fire. First shut down the engine. Suppress the fire quickly and avoid being faced with a widely spread fire that is difficult to contain.

OBJECTIVE 1-12

The front end loader operator will describe a miss-hole and state the procedure for reporting the location of a miss-hole.

KEYPOINTS/PROCEDURES

1. A miss-hole is a drill hole that was loaded with explosives which did not explode during the blast, leaving the hole still full of powder.
2. A front end loader operator noticing a miss-hole, while loading material, should notify the supervisor immediately. Properly mark the miss-hole and do not operate within 25 feet until the powder is removed and defused.

OBJECTIVE 1-13

The front end loader operator will explain the company's power cable handling policy.

KEYPOINTS/PROCEDURES

1. Each company should establish a power cable handling policy to be followed by all personnel handling power cable. The policy should include the following precautions:
   - 10,000 volt hot gloves and other approved protective devices must be used at all times when handling power cable. Do not step on power cable or allow power cable to come in contact with any other part of the body. Inspect the hot gloves before use and discard them if they are defective. Do not use hot gloves if they are wet inside. Hot gloves must be covered with leathers and should not be used for any purpose other than handling power cable.
   - All power cable attached to sub-stations or switch houses must be treated as energized.
   - Never place any part of the body, even if protected by hot gloves, on or near cable terminals located inside potheads and junction boxes.
   - No one, other than an authorized person, is to energize, de-energize, connect or disconnect power cables.
   - Cable arches must be treated the same as power cable when the cable over the arch is connected to a sub-station or switch house. Report any cuts or bruises in the cable. Do not handle damaged power cable unless it has been checked by an authorized person. Only qulified electricians are authorized to make repairs to power cables.
   - Never run over unprotected power cable with any vehicle or piece of equipment.
   - Never pull more than 75 feet of power cable in a single pull. Power cables can be damaged by stretching.
   - When junction boxes and potheads are being moved, they must be adequately supported and kept clear of the pit floor. Rough handling of junction boxes can cause damage to the boxes and to the power cable by the flexing of the cables at the boxes.
   - Disconnected power cable retains a residual charge of about 110 volts. Caution must be used when handling disconnected cable.
   - The input side (hotside) of the switch house must be padlocked, if it is a pothead so that it cannot be removed.

OBJECTIVE 1-14

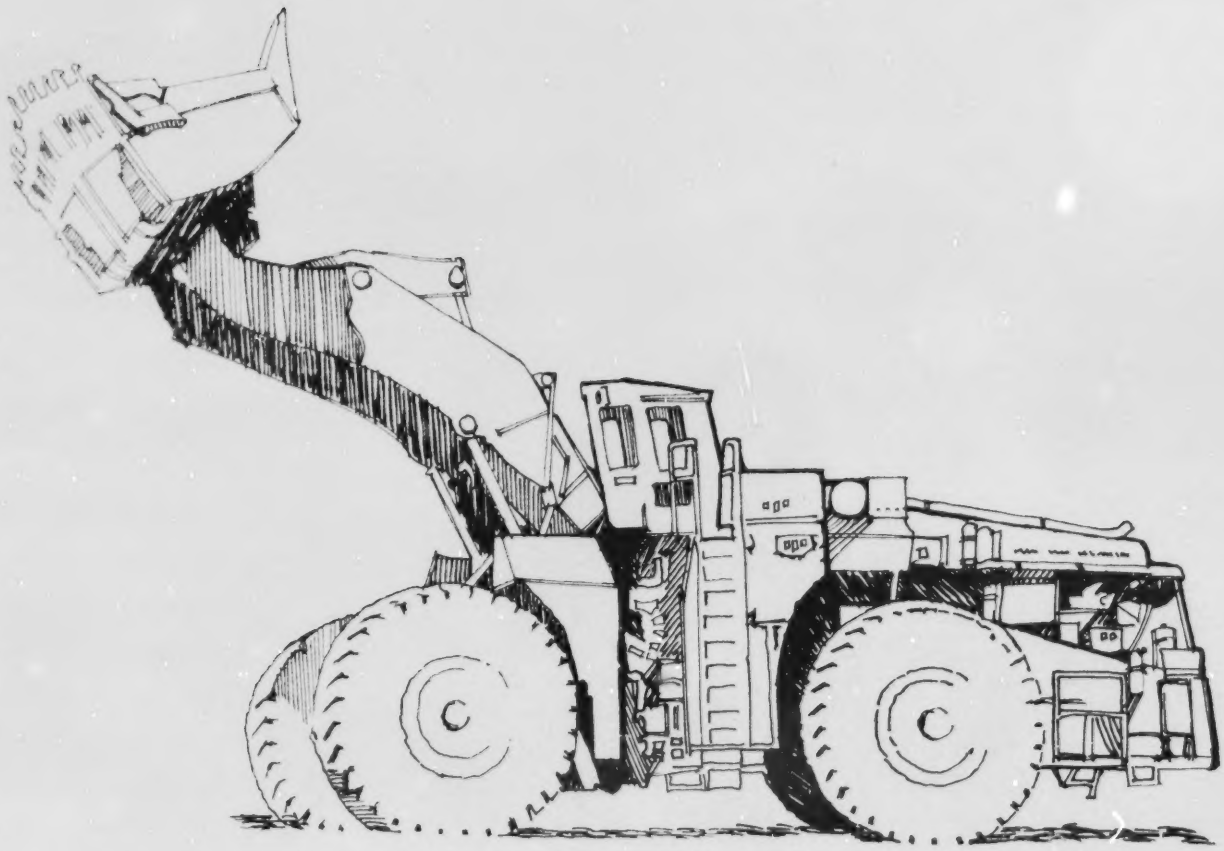
The front end loader operator will explain the company's lock-out procedures.

KEYPOINTS/PROCEDURES

1. To ensure the safety of maintenance and operating personnel, the company should establish a procedure for locking-out equipment, to be followed by all personnel.
2. Locking-out equipment means that wherever the possibility of equipment starting, energizing, or moving exists, which can create a hazardous situation, that piece of equipment should be locked-out and tagged by the operator. A lock-out procedure is designed to prevent accidents and personal injury. Never remove another worker's padlock or tag without authorization. Check with the supervisor for instructions.
3. The front end loader operator is required to know the location of the lock-out station for the front end loader, and must always check the station for padlocks or "do not operate" tags before starting the front end loader.

COMMUNICATIONS

module 2



OBJECTIVE 2-1

The front end loader operator will describe:

a. The horn signals used by the loador, truck and shovel operators.

b. The traffic light system for dumping at the breaker station, grizzly or crusher.

KEYPOINTS/PROCEDURES

1. A signal for HELP WANTED should be established at the property and all of the employees informed of it.

2. **Front end loader operator's or shovel operator's signals**

   The front end loader operator is required to give the following signals to the operators of other pieces of equipment:

   - Start engine — one blast.
   - Stop — one blast.
   - Go ahead — two blasts.
   - Back up — three blasts.
   - Reposition or tail load — four blasts.

3. **Truck operator's signals**

   The front end loader operator is required to know these horn signals:

   - Start engine — one blast.
   - Stop — one blast.
   - Go ahead — two blasts.
   - Back up — three blasts.

   All trucks should be equipped with automatic back up horns. The front end loader operator should be alert to a haulage truck backing up.

4. **Lights at the crusher or breaker station**

   Mines that require front end loaders to dump material into a grizzly, bin, or crusher that has a signal light system attached to it require operators to know the following lights:

   - Red -- Do not dump material into the bins, crushers or grizzlies.
   - Green — All clear to dump material.

OBJECTIVE 2-2

Given a sample of the reporting forms used by the company, the front end loader operator will complete production reports, timecards and the daily logbook.

KEYPOINTS/PROCEDURES

1. **Production reports**

   The production reports are to be filled out to include the:

   - Number of the loader being operated.
   - Area code number of the pit in which the front end loader is working.
   - Code number of the material being loaded.
   - Code number of where the material is being dumped.
   - Hours worked in the shift.
   - Number of hours of downtime if any.

   Production reports are used for costing and planning purposes. Therefore it is imperative that they be accurate.

2. **Timecards**

   Timecards should include the:

   - Code number for the proper job classification and rate of pay.
   - Number for the hours worked on each job.
   - Number of the front end loader being operated.
   - Area number of the pit in which the front end loader is working.
   - Code number of the type of material being dumped or loaded.
   - Code number of where the material is being dumped.
   - Number for the total number of hours worked on each shift.

3. **Daily logbooks**

   The daily logbooks are filled out regularly and cover the following information:

   - General repairs to the front end loader.
   - Fuel up times so that the oncoming front end loader operator knows approximately how much fuel is left.
   - Any general information for example on steering and brakes which can help the oncoming operator.

   Rule 263 (e) of the *Mines Regulation Act* and rule 195 (e) of the *Coal Mines Regulation Act* state:

   > (e) For each vehicle or piece of mobile equipment, a logbook or other suitable record shall be maintained, in which shall be entered a record of all unsafe conditions and the repairs made, and all notations shall be signed by the person making the entry, and the logbook or records shall be available for inspection at all times.

4. It is important that the oncoming operator knows the prior shift's history of the loader. Operators should report unsafe or hazardous equipment conditions first of all to the supervisor and then to the oncoming front end loader operator.

OBJECTIVE 2-3

The front end loader operator will operate the mobile radio on the mine site and explain the proper procedures for its use.

KEYPOINTS/PROCEDURES

1. Proper and effective use of the radio is important. Take the following steps:
   a. Identify the sender by unit or vehicle number.
   b. Identify the receiver by unit or vehicle number.
   c. Wait until the receiver acknowledges.
   d. Relay the message in a clear and precise manner.
   e. State whether the call is an emergency or not.
2. Radio use is restricted to necessary operational transmissions. Use no profane language over the radio at any time.
3. In the event of an unsafe situation or an emergency, contact the dispatcher or supervisor immediately. If radio silence is necessary, either the dispatcher or the immediate supervisor can call for it. This depends on procedures established at the mine.

OBJECTIVE 2-4

The front end loader operator will explain the different survey stakes used at the mine site.

KEYPOINTS/PROCEDURES

1. Companies have their own color and flagging codes and should include this information.

2. **Primary control points**

   The primary control point is the basis for all survey work in the area and has been set with the utmost accuracy.

3. **Secondary control hubs**

   Secondary control hubs are set from the primary control point and are the basis of all the actual field work.

4. **Batterboards**

   Batterboards are used for sighting bench grades.

5. **Drill hole stakes**

   Drill hole stakes locate the position of a drill hole for blasting. On the stake is the number of the blast hole and the depth it is to be drilled. These stakes are retained after drilling, for loading information.

6. **Drill limit stakes**

   Drill limit stakes mark the drilling boundary in order to avoid unnecessary drilling.

7. **Digging limit stakes**

   Digging limit stakes indicate the limit the digging is to go to. Digging beyond this stake can be a wasted effort.

8. **Blast boundaries**

   Blast boundary stakes indicate the limit of cleanup required to start drilling a new blast area, and the limit of digging of the previous blast.

9. **Dump monitors**

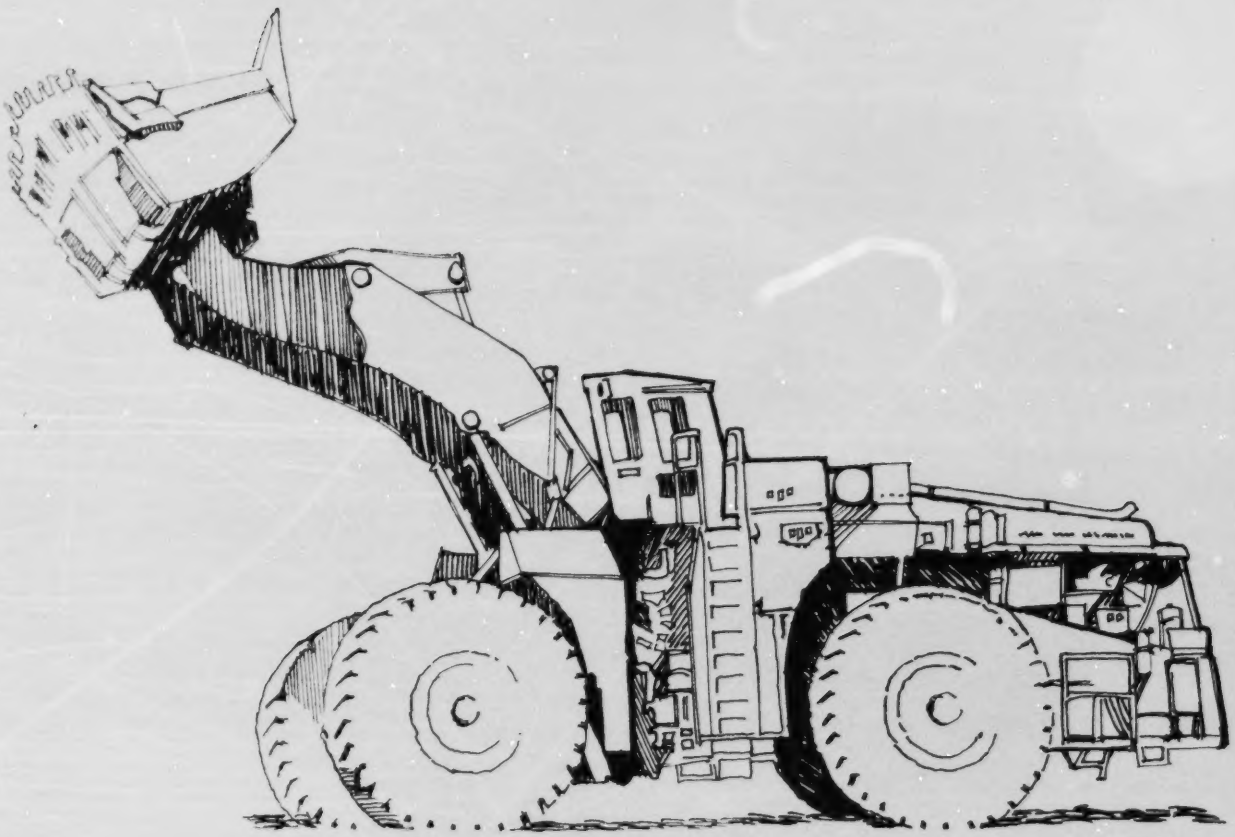
   Dump monitor stakes indicate the amount of settling or movement of a dump. These monitors are extremely important for safety and should be checked regularly.

10. **Road stakes**

    Road stakes mark the center and shoulders of the road surface.

GAUGES AND CONTROLS

module 3



OBJECTIVE 3-1

The front end loader operator will locate and identify each of the gauges, controls and switches on the loader dashboard.

KEYPOINTS/PROCEDURES

1. Front end loader gauges include:
   - Fuel gauge.
   - Water temperature gauge.
   - Oil pressure gauge.
   - Ammeter gauge.
   - Speedometer.
   - Air pressure gauge.
   - Hydraulic reservoir air pressure gauge.
   - Hydraulic oil temperature gauge.
   - Hour meter.
2. Front end loader controls and switches include:
   - Steering wheel.
   - Directional control lever.
   - Accelerator pedal.
   - Hill hold pedal.
   - Service brake pedal.
   - Horn button.
   - Bucket control lever.
   - Hoist control lever.
   - Park brake control.
   - High/low idle switch.
   - Starter button.
   - Key switch.
   - Windshield wiper control
   - Interior light switch
   - DC light switch (front).
   - AC light switch (front).
   - Panel light switch.
   - DC light switch (rear).
   - AC light switch (rear).
   - Fast hoist bypass switch.
   - Height limit bypass switch.
   - Climate control panel.
   - Light test switch.
   - Cold start aid.
   - Hydraulic reservoir air regulator.

OBJECTIVE 3-2

The front end loader operator will describe the function and state the normal ranges of each of the following gauges.

KEYPOINTS/PROCEDURES

1. The procedures for handling abnormal or unacceptable readings on the gauges are covered in OBJECTIVE 3-4.

2. **Fuel gauge**

   The fuel gauge indicates the level of fuel in the tank.

3. **Water temperature gauge**

   The water temperature gauge monitors the coolant temperature in the engine. Normal operating readings are from 170°F to 185°F.

4. **Oil pressure gauge**

   The oil pressure gauge indicates the oil pressure in the engine. Normal operating readings in high idle are approximately 60 psi and below 30 psi in low idle.

5. **Ammeter gauge**

   The ammeter gauge indicates the amount of current flowing to or from the battery. For normal operation there should be a slight positive charge.

6. **Speedometer**

   The speedometer indicates the ground speed of the loader in either forward or reverse. The maximum speed of the loader is 12 mph.

7. **Air pressure gauge**

   The air pressure gauge indicates the amount of air in the air tanks that is available for the air brakes. The normal operating pressure should be between 90 and 120 psi.

8. **Hydraulic reservoir air pressure gauge**

   The hydraulic reservoir air pressure gauge registers the amount of air pressure in the hydraulic oil tank. The normal operating pressure is from 5 to 9 psi maximum.

9. **Hydraulic oil temperature gauge**

   The hydraulic oil temperature gauge shows the temperature of the hydraulic oil in the hydraulic oil reservoir. The normal operating range is from 140°F to 160°F.

10. **Hour meter**

    The hour meter records the actual time the engine has been running.

OBJECTIVE 3-3

The front end loader operator will describe the function of each of the following controls and switches.

KEYPOINTS/PROCEDURES

1. **Steering wheel**

   The steering wheel controls the direction of travel of the front end loader.

2. **Directional control lever**

   The directional control lever is a three position lever; forward, neutral and reverse. The lever selects the direction of movement of the front end loader.

3. **Accelerator (potentiometer pedal)**

   The accelerator governs the speed of the front end loader in either direction. When the pedal is released, the speed decreases and the automatic dynamic braking brings the front end loader to a halt.

4. **Hill hold pedal**

   The hill hold pedal or dynamic brake boost increases the amount of dynamic braking available at low speeds.

5. **Service brake pedal**

   The service brake pedal applies and releases the air operated over the hydraulic brakes.

6. **Horn button**

   The horn button sounds the air horn.

7. **Bucket control lever**

   The bucket control lever controls the bucket positions; dump, level and roll back.

8. **Hoist control lever**

   The hoist control lever controls the raising and lowering of the boom hydraulically.

9. **Park brake control**

   The park brake button activates the air operated front brakes and shuts off the supply of electrical power to the wheel motors.

10. **High/low idle switch**

    The high/low idle switch controls the rpm of the engine for normal operation. When the switch is in the low idle position, it lowers the rpm of the engine and cuts out excitation to the wheel motors. The loader must be in high idle for operation.

11. **Starter button**

    The starter button activates the starter when it is pushed.

12. **Key switch**

    The key switch activates the electrical circuits on the loader when in the on position. It has three positions; on, off and stop. The stop position stops the engine.

13. **Windshield wiper control**

The windshield wiper control activates the windshield wipers.

14. **Interior light switch**

The interior light switch turns the interior cab light on and off.

15. **DC light switch (front)**

The front DC light switch activates the two DC lights on the front of the cab and the tail lights.

16. **AC light switch (front)**

The front AC light switch activates the two pole mounted lights at the front of the loader.

17. **Panel light switch**

The panel light switch activates all the panel lights on the dash.

18. **DC light switch (rear)**

The rear DC light switch activates the rear mounted lights.

19. **AC light switch (rear)**

The rear AC light switch activates the two rear cab mounted lights.

20. **Fast hoist bypass switch**

The fast hoist bypass switch activates a second pump for added speed for the lift cycle.

21. **Height limit bypass switch**

The height limit bypass switch controls the height of the boom.

22. **Climate control panel**

The climate control panel operates the heating, pressurization and cooling systems of the cab.

23. **Light test switch**

The light test switch tests all of the panel lights except the dynamic brake light.

24. **Cold start aid**

The cold start aid helps to start the engine during cold weather.

25. **Hydraulic reservoir air regulator**

The hydraulic reservoir air regulator controls the air pressure in the hydraulic tank.

OBJECTIVE 3-4

The front end loader operator will describe the following warning signals and explain the action to take if a signal appears.

KEYPOINTS/PROCEDURES

1. **Water temperature light**

   The water temperature light glows red and a buzzer rings when a high coolant temperature occurs (225°F). The buzzer only sounds when the front end loader is in high idle. The front end loader operator should follow these procedures:

   a. Direct the front end loader immediately to a safe place and park out of the way of other traffic.

   b. Check the temperature gauge.

   c. Let the machine idle.

   d. Check the radiator for paper and rags.

   e. Check the fan belts and radiator hoses.

   f. Check the coolant level in the sightglass.

   g. Shut down the engine if the temperature does not drop.

   h. Report to the supervisor.

2. **Air filter light**

   The air filter light glows red and a buzzer rings when the filters become plugged. Check the filters immediately before the loader is operated.

3. **Oil pressure light**

   The oil pressure light glows red and a buzzer sounds when the oil pressure drops below 15 psi in low idle and below 30 psi in high idle. The front end loader operator should follow these procedures:

   a. Direct the front end loader immediately to a safe place and park out of the way of other traffic.

   b. Shut down the engine.

   c. Check the engine oil level.

   d. Check for engine oil leaks.

   e. Report any faulty conditions to the supervisor.

   f. Do not operate the front end loader until it is serviced.

4. **Emergency steering light**

   The emergency steering light glows red, when the steering pressure drops below 30 psi in high idle. Two battery operated pumps automatically come on supplying enough pressure to manoeuver the front end loader. The pumps operate only when the loader is in high idle. The front end loader operator should follow these procedures:

   a. Direct the front end loader immediately to a safe place and park out of the way of other traffic.

   b. Switch the front end loader to low idle.

c. Investigate for problem.

d. Do not operate the front end loader until it is repaired.

5. **Hydraulic brakes indicator lights**

   The hydraulic brakes indicator lights glow amber whenever the hydraulics are applied.

6. **Hydraulic oil warning light (low level or high temperature)**

   The hydraulic oil warning light glows red when the oil level drops below a predetermined level or when the oil temperature reaches excessive levels. The front end loader operator should follow these procedures:

   a. Direct the front end loader immediately to a safe place and park out of the way of other traffic.

   b. Check the hydraulic temperature gauge and the oil level in the sightglass. (One of these should determine the malfunction.)

   c. Investigate for the cause of the malfunction.

   d. Report to the supervisor.

   e. Do not operate the front end loader until it is repaired.

7. **Blower off warning light**

   The blower off warning light glows red whenever one of the following blowers fails:

   - Blower to the front axle.
   - Blower to the rear axle.
   - Blower to the main generator.

8. **Dynamic braking indicator light**

   The dynamic braking light glows amber whenever the dynamic brakes are being used.

9. **Converter warning light**

   There are six warning lights on the converter warning light panel:

   - Left front light.
   - Right front light.
   - Field light.
   - Left rear light.
   - Right rear light.
   - Volt regulator light.

   The lights come on and glow red to indicate:

   - Blown fuses.
   - Phase sequence errors.
   - Low AC voltage.
   - Low power supply voltage.
   - Excessive high temperature in the DC motors, generator or converter SCRs.

The front end loader operator should follow these procedures:

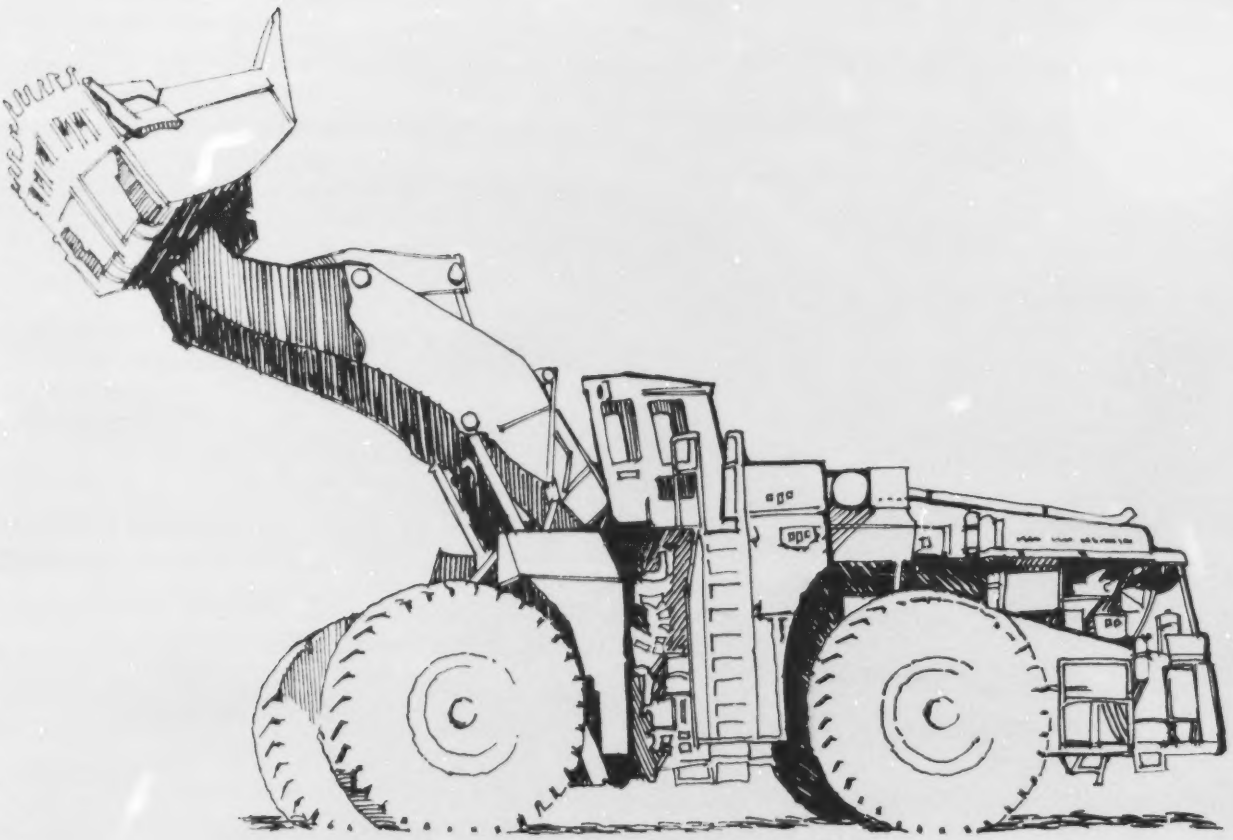
a. Direct the front end loader immediately to a safe place and park out of the way of other traffic.

b. With the front end loader in high idle and running, allow it to run for 15 minutes and the indicators should go out. This allows the loader to cool down. The probable cause of the warning light is overheating.

c. If the loader runs sporadically, shut it down and have it serviced.

PRE-START AND OPERATIONAL CHECKS

module 4



OBJECTIVE 4-1

The front end loader operator will locate and identify the basic units and related components on the front end loader.

KEYPOINTS/PROCEDURES

1. **Main frame**

   The main frame is divided into the front frame and the rear frame. The main frame is the basic unit to which all other units and components are mounted.

2. **Power train**

   The power train unit consists of the:

   - Diesel engine.
   - Main generator.
   - Traction motors.
   - Drive assemblies.
   - Tires.

3. **Structural components**

   The structural components consist of the platform and the operator's cab.

4. **Engine**

   The engine unit includes the:

   - Radiator assembly.
   - Air cleaners.
   - Alternator.
   - Turbochargers.
   - Starting motor.
   - Fuel systems.
   - Electric starters.

5. **Hoisting assembly**

   The hoisting assembly includes the:

   - Bucket.
   - Boom.
   - Lift arm assembly.
   - Connecting pins.
   - Hydraulic cylinders and lines.

OBJECTIVE 4-2

The front end loader operator will locate in a systematic sequence, the pre-start and running check points on the front end loader.

KEYPOINTS/PROCEDURES

1. The front end loader pre-start and running check points are:
   - Check the cab for warning flags, lockout tags, and read the previous entry in the logbook. Check around the front end loader for personnel.
   - Claim the loader.
   - Articulating points.
   - Steering cylinders and keepers.
   - Hydraulic hoses.
   - Soft stop steering.
   - Radiator.
   - Husco valve.
   - Servo, ram and keepers.
   - Emergency steering motor and pump.
   - Grease system.
   - Auxiliary air tanks.
   - Electrical cabinet doors.
   - Tires and wheels.
   - Front planetaries.
   - Bucket.
   - Hoist rams, keepers, and pins (trunions).
   - Tile rams, keepers and pins.
   - Boom.
   - Hydraulic oil cooler.
   - Hydraulic oil level.
   - Engine oil level.
   - Engine oil leaks.
   - Fan belts.
   - Alternator belts.
   - Rear blower assembly.
   - Main generator blower.
   - Hydraulic pumps and transfer case.
   - Hydraulic pump U-joint.
   - Servo pump belt.
   - Coolant level.
   - Lights

- Glass
- Ladders and handrails.
- Seat belts.
- Fire extinguisher and fire suppression systems.

OBJECTIVE 4-3

The front end loader operator will perform a pre-start check of the front end loader and describe both the acceptable conditions for each check point and the problems that should be reported to the supervisor.

KEYPOINTS/PROCEDURES

1. **Check the cab for warning flags, lockout tags and read the previous entry in the logbook**

   Before commencing the pre-start check, inspect the cab area for other operators, warning flags or lockout tags and read the logbook entries. Also check to ensure there are not personnel working under or in the immediate vicinity of the loader.

2. **Claim the loader**

   Claim the loader to make sure that no one else moves it. Leave a lunch bucket or some other visual indicator to identify that the front end loader is in use.

3. **Articulating points**

   Check the front and rear frame articulating points for:

   - Build up dirt and debris.
   - Secure capture plate and bearing caps.
   - Loose or missing bolts.

4. **Steering cylinder and keepers.**

   Check the steering cylinders for leaking hydraulic lines and make sure that the ends of the cylinders are not leaking. Check the pins and keepers to ensure that they are secure and that there is no excessive wear.

5. **Hydraulic hoses**

   Check the large hydraulic hoses in the articulating area. Also check the hoses for leaks and that they are not rubbing together.

6. **Soft stop steering**

   Check the soft stop steering switches, mounted at the top of the main frame, at the articulating point near the pin. The switches control the oil pressure to the soft stop servo cylinders. The switches get clogged with dirt and grease and cause the soft stop steering to stop working. If the steering is stiff, clogging is usually the cause.

7. **Radiator**

   Check the front of the radiator to ensure that it is not obstructed with rags or papers.

8. **Husco valve**

   The husco valve is a large distribution block for the hydraulic system. Check the connection at the valve for oil leaks.

9. **Servo, ram and keepers**

   Check the servo cylinder for oil leaks. Also check the mounting pins at each end to ensure that they are in good condition. Ensure that the ram is not bent.

10. **Emergency steering motor and pump**

Check the mounting bolts and brackets for the steering motor and pump. Check the hydraulic hoses of the pump and look for any loose or broken electrical wires on the motor.

11. **Grease system**

Check the level of grease in the grease cannister. Manually operate the greasing system to ensure that it is working properly. During normal operation the automatic timer should cycle every 20 minutes. This should take about two minutes.

12. **Auxiliary air tanks**

Check the two auxiliary air tanks for air leaks. There is no need to drain the tanks because they are automatically drained of any moisture.

13. **Electrical cabinet doors**

Check the cabinet doors to be sure that they are closed tightly. The doors have to be closed before the front end loader can move. A switch cuts off excitation to the wheel motors if the cabinet doors are open.

14. **Tires and wheels**

Check the tires and wheels for:

- Proper inflation.
- Cuts and possible separations.
- Embedded rocks.
- Cracks and breaks of the rims and a missing driver lug.
- Wear or breakages of the valve stems.
- Tighten wheel bolts or missing or broken parts.

Allow only three missing bolts in a row before having the front end loader repaired.

15. **Front planetaries**

Check each planetary for oil leaks and excessive heat. The planetary cover should be felt for excessive heat buildup. If there is an overheating problem, have the oil level checked in the planetary before resuming production.

16. **Bucket**

Check the bucket visually for:

- General condition.
- Wear on the teeth or adapters.
- Cutting edges.
- Side cutters.
- Spill guards.

17. **Hoist rams, keepers and pins (trunions)**

Check the hoist cylinders for:

- Hydraulic oil leaks from the hoses and packing.
- Damaged rams.
- Secure unworn pins and retainers.

18. Tilt rams, keepers and pins

Check the tilt cylinder for:

- Hydraulic oil leaks from the hoses and packing.
- A damaged bent ram.
- Secure unworn pins and retainers.

19. Boom

Check the boom for:

- Cracks.
- Secure bucket mounting, pins, and keepers.
- Boom anchors, pins and trunions. Check for wear and loose or missing bolts.

20. Hydraulic oil cooler

Check the screen in front of the fan to ensure that it is free of paper and other debris. The fan is thermostatically controlled and forces air through a series of radiators that cool the hydraulic oil.

21. Hydraulic oil level

Check the hydraulic oil level in the sightglass. The level is good if the level in the sightglass is full when the bucket is resting on the ground. If the oil level is at the bottom of the sightglass, have the level brought up to the operating range.

22. Engine oil level

Check the engine oil level at the beginning of each shift. The front end loader must be parked on level ground. Front end loaders equipped with Caterpillar or Cummins engines can have the oil level checked with engine running or stopped. The dipstick has level markers on both sides one side is for a running reading and the other for a stopped reading. Take care to read the appropriate side. Front end loaders equipped with General Motors engines (Jimmy) can only have the Jimmy engine oil level checked while it is stopped. The engine must cool down at least five minutes before the level can be read properly.

Caution:

If the oil level is on the "add" mark, do not operate the engine until the oil level is brought back to the "full" mark.

23. Engine oil leaks

Check the engine for engine oil leaks. Have any leaks checked out immediately.

24. Fan belts

Check the fan belts for general condition and proper adjustment.

25. Alternator belts

Check the alternator belts for general condition and proper adjustment.

26. Rear blower assembly

Check the rear blower assembly which cools the traction motors. Ensure that the piping and duct work are intact and tight. Repair any faulty duct work before operating.

27. Main generator blower

Check that the piping and duct work from the blower to the main generator are secure and intact. If not, the front end loader must be shut down until the problem has been repaired.

28. Hydraulic pumps and transfer case

Check the hydraulic pumps and transfer case for:

- Excessive heat.
- Loose or missing mounting bolts.
- Oil leaks at the pumps.

29. Hydraulic pump U-joint

Check the U-joint connecting the main generator to the hydraulic pump for side play or wobble.

30. Servo pump belt

Check the general condition and proper adjustment of the belt.

31. Coolant level

Check the sightglass to see that the coolant level is in the upper half of the sightglass. If the level is in the bottom half of the sightglass, have the coolant topped up.

32. Lights

Check the headlights, backup lights, tail lights and AC lights. Turn them on to see if any are burned out or broken.

33. Glass

Check the windshield, side windows and mirrors for general condition. Have any broken windows or mirrors replaced. Also, all glass should be kept clean for good visibility.

34. Ladders and handrails

Check all ladder rungs and handrails for general condition. Anything loose or broken should be reported and fixed.

35. Seat belts

Check to make sure that the seat belts are in good condition, properly anchored and adjusted for the operator. Operators on front end loaders are to use seat belts at all times. Rule 277 (c) of the *Mines Regulation Act* states:

> Lap seat belts of an approved type shall be installed in all mobile equipment fitted with a roll-over protective structure, and it shall be the duty of the operators of such equipment to wear the seat belts at all times.

36. Fire extinguisher and fire suppression systems

Check to ensure that there is a fire extinguisher on the front end loader. Also, check the seals on the extinguisher to ensure that none are lost or broken and that the gauge reads full. Front end loaders that have suppression systems require the seals on the cylinders to be checked to ensure that they have not been punctured.

OBJECTIVE 4-4

The front end loader operator will perform proper engine start up and shut down procedures.

KEYPOINTS/PROCEDURES

Start up

Follow these procedures to start the engine:

a. Manually reset the fuel solenoid.

b. Check that the park brake is on.

c. Check that the range selector is in neutral.

d. Check that the hoist and tilt controls are in the hold position.

e. Check that the high/low idle switch is in the low idle position.

f. Turn the key lock switch to the on position.

g. Move the light test switch to the test position and check all of the warning and indicator lights for operation.

h. Place the height limit bypass switch in the up position.

i. Depress and hold the start switch until the engine has started.

Only crank the engine over for 30 seconds at a time, then let the starter cool for fifteen seconds. These procedures are for an air temperature of above 60°F or 16°C.

2. **Shut down**

Follow these procedures to shut down the engine:

a. Park the front end loader in a convenient and safe area.

b. Bring the loader to a complete stop.

c. Position the bucket flat on the ground and apply slight pressure.

d. Place the hoist and tilt levers in the hold position.

e. Apply the park brake.

f. Move the directional control lever to the neutral position.

g. Move the high/low idle switch to the low idle position.

h. Let the engine idle for five minutes to cool down.

i. Turn the key to the off position.

OBJECTIVE 4-5

The front end loader operator will perform operational checks on the brakes, steering and hydraulic controls prior to putting the front end loader into production. The operator will also describe the acceptable conditions for each check and the problems that should be reported to the supervisor.

KEYPOINTS/PROCEDURES

1. **Service brakes**

   To check the brakes on a front end loader, the operator must:

   a. Place the high/low switch into high idle.

   b. Raise the bucket slightly off of the ground.

   c. Release the park brake.

   d. Place the directional control lever into forward.

   e. Accelerate to 2 mph and then apply the service brake as hard as possible. The loader should stop suddenly. If the loader does not stop suddenly, have the brakes examined or repaired before putting the loader back into production.

2. **Forward and reverse motion**

   To check the forward and reverse motion the front end loader operator must:

   a. Place the high/low idle switch into high idle.

   b. Raise the bucket slightly off of the ground.

   c. Release the park brake.

   d. Place the directional control lever into forward.

   e. Accelerate to 5 miles per hour.

   f. While the loader is moving forward, place the directional control lever into reverse.

   g. Slowly release the pressure on the accelerator pedal, the loader should slowly come to a stop.

   h. Depress the hill hold pedal to bring the loader to a stop.

   i. Depress the accelerator pedal slowly and the loader should move slowly in the reverse direction.

   It is not possible to reverse the motion until the loader has come to a complete stop.

3. **Dynamic brakes**

   To check the dynamic brakes the front end loader operator must:

   a. Place the high/low idle switch into high idle.

   b. Raise the bucket off of the ground slightly.

   c. Place the directional control lever into forward.

   d. Press down on the accelerator and accelerate to 5 mph. Then release the accelerator pedal.

   e. The dynamic brakes should come on and bring the loader nearly to a stop.

   f. In order to complete the stop, depress the hill hold pedal.

The dynamic brakes work the same in reverse. Also, the dynamic brake light comes on when the dynamic brakes are working.

4. **Hill hold pedal**

   To check the hill hold pedal the front end loader operator must:

   a. Place the high/low idle switch into high idle.

   b. Raise the bucket slightly off of the ground.

   c. Place the directional control lever into forward.

   d. Press down on the accelerator and accelerate to 5 mph. Then release the accelerator pedal.

   e. The dynamic brakes should come on and bring the front end loader nearly to a stop.

   f. Press down on the hill hold pedal. The front end loader should come to a stop and be held stationary.

   The hill hold pedal increases the dynamic braking and when applied, the front end loader has a normal tendency to rock back and forth.

5. **Steering**

   To check the steering the front end loader operator must:

   a. Place the high/low idle switch in the high idle position.

   b. Raise the bucket off of the ground slightly.

   c. Turn the front end loader in both directions. The front end loader should turn very easily.

   Caution:

   If the steering is hard, have the steering system checked. Never operate a front end loader with steering problems. Have it repaired immediately.

6. **Hoist control**

   To check the hoist on the front end loader, the operator must:

   a. Start the engine.

   b. Pull the hoist control lever back to raise the bucket.

   c. Push the lever forward and the bucket should lower.

   Check that the hydraulic system works with the front end loader in low idle. Report any problem with the hoist immediately.

7. **Tilt control**

   To check the tilt control, the front end loader operator must:

   a. Start the engine.

   b. Lift the bucket off of the ground to approximately one half of the maximum hoisting height.

   c. Push the tilt control lever forward and the bucket should roll.

   d. Pull the tilt control lever back and the bucket should roll back in.

   Any malfunction must be repaired before operating the front end loader.

OBJECTIVE 4-6

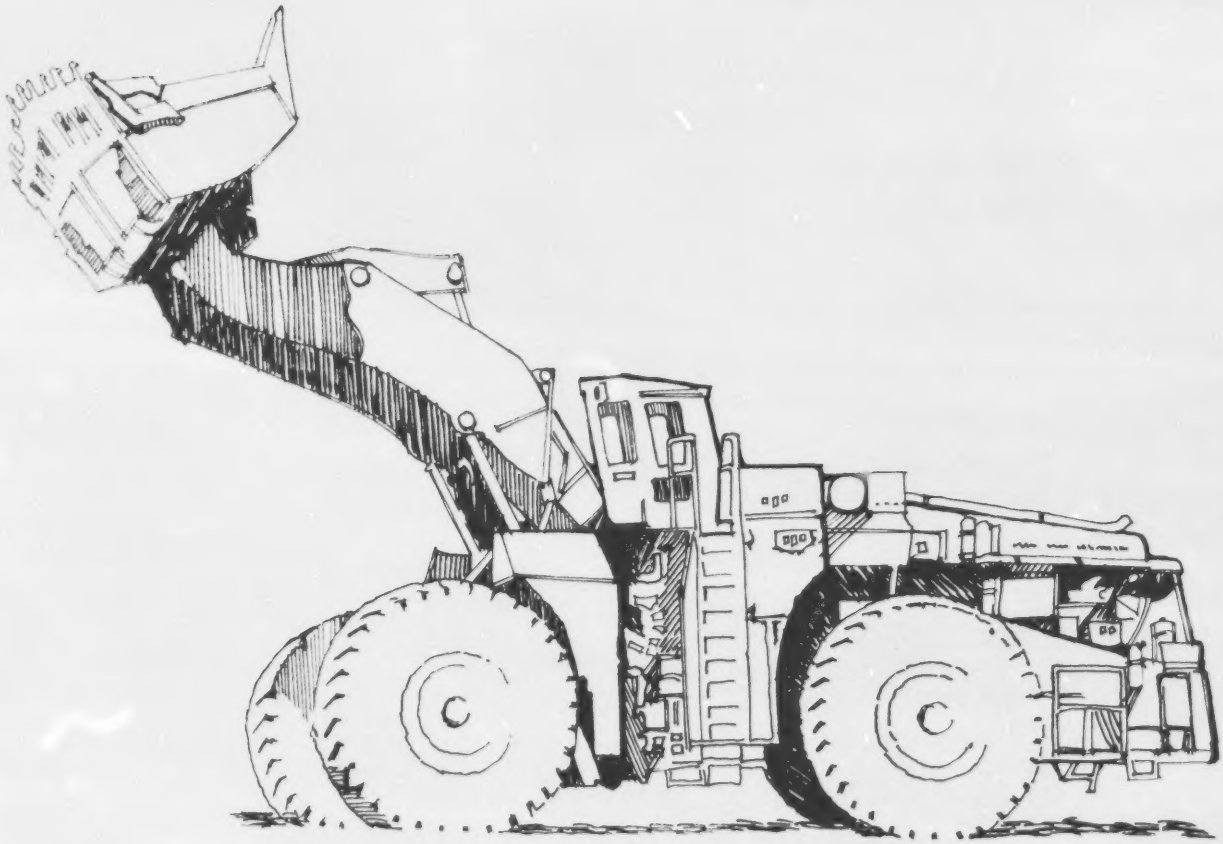
The front end loader operator will describe the proper procedures for a cold weather start of the front end loader engine.

KEYPOINTS/PROCEDURES

1. Start up procedures are given in OBJECTIVE 4-4.
2. Follow these procedures for cold weather starting:
   a. Pull the "T" handle which is located behind the seat on the left hand side and release it during cranking.
   b. Crank the engine over.
   c. If the engine does not start on the first application of the starting fluid, repeat the process until the engine starts.
   d. Once started the engine should be allowed to warm up to at least 120°F on the temperature gauge. When the engine temperature has reached 120°F, the solenoid automatically eliminates any chance of using starting fluid.
   e. If the engine has been cranked over by the starter for more than half a minute, let the starter cool off for fifteen seconds before starting to crank again.

BASIC OPERATION

module 5



OBJECTIVE 5-1

The front end loader operator will demonstrate moving the front end loader forward in normal operating conditions and slowly in close quarters.

KEYPOINTS/PROCEDURES

1. **Normal forward motion**

   Follow these procedures to move the front end loader forward:

   a. Before moving the front end loader check for personnel and equipment around the immediate vicinity of the loader.

   b. Once the engine is started, check all of the indicators to make sure that everything is functioning properly.

   c. Adjust and fasten the seat belt.

   d. Push down on the hill hold pedal to hold the front end loader stationary.

   e. Place the high/low idle switch into the high idle position.

   f. Raise the bucket off of the ground slightly.

   g. Release the park brake.

   h. Place the directional control lever into forward.

   i. Release the hill hold pedal.

   j. Apply the accelerator pedal slowly and the front end loader should begin to move slowly forward.

2. **Slow movement**

   The front end loader ground speed is governed by the accelerator pedal.

OBJECTIVE 5-2

The front end loader operator will demonstrate moving the loader in reverse, including reversing during production.

KEYPOINTS/PROCEDURES

1. Follow these procedures to reverse the front end loader:
   a. Before moving the front end loader check for personnel and equipment around the immediate vicinity of the loader.
   b. Once the engine is started, check all of the indicators to make sure that they are functioning properly.
   c. Adjust and fasten the seat belt.
   d. Apply the hill hold pedal and push down to hold the front end loader stationary.
   e. Place the high/low idle switch to the high idle position.
   f. Raise the bucket off of the ground slightly.
   g. Release the park brake.
   h. Place the directional control lever into reverse.
   i. Release the hill hold pedal.
   j. Apply the accelerator pedal slowly and the front end loader should slowly move backwards.

OBJECTIVE 5-3

The front end loader operator will demonstrate the proper techniques for changing the direction of travel.

KEYPOINTS/PROCEDURES

1. There are two procedures to change the direction of travel of the front end loader. These procedures work in both directions.
2. **Procedure 1**
   a. While travelling forward, completely release the accelerator.
   b. The front end loader must come to a complete stop.
   c. Position the directional control lever into reverse.
   d. Press down on the accelerator and the loader should move backwards.
3. **Procedure 2**
   a. While the loader is moving forward, put the directional control lever in the reverse position.
   b. When the loader reaches the desired place, fully release the accelerator pedal.
   c. Press down on the accelerator pedal again.
   d. The loader must completely stop before moving in reverse.

OBJECTIVE 5-4

The front end loader operator, using proper steering procedures will demonstrate turning the loader in both directions.

KEYPOINTS/PROCEDURES

1. **Left turns**

   To turn the loader to the left, rotate the steering wheel to the left. The degree of the tightness of the turn is in relation to the number of rotations and the time it takes to make the turn.

2. **Right turns**

   To turn the loader to the right, rotate the steering wheel to the right.

   Caution:

   When making tight turns in either direction, keep the speed to a minimum. Tight turns at high speeds can cause costly tire damage.

OBJECTIVE 5-5

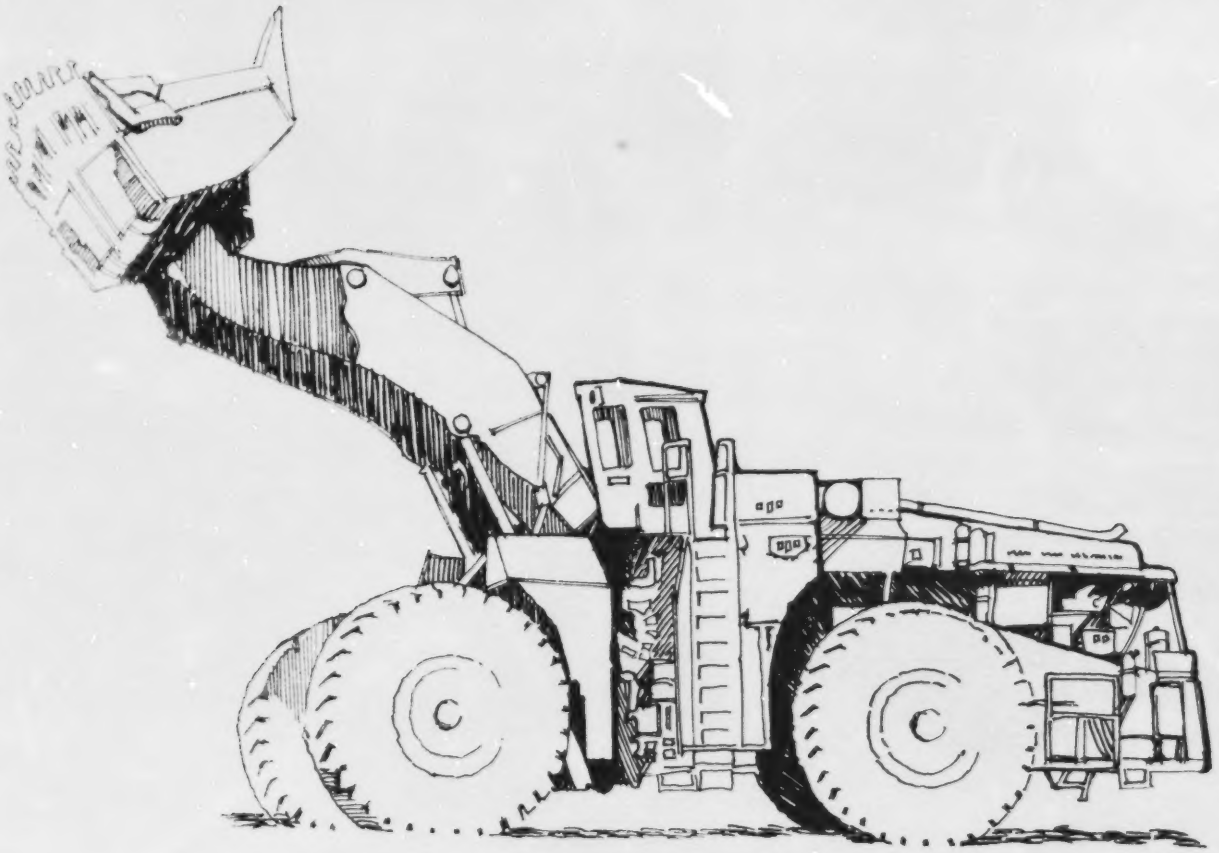
The front end loader operator will demonstrate the proper techniques to stop and park the front end loader.

KEYPOINTS/PROCEDURES

1. To stop and park the front end loader the operator should:
   a. Select a safe and level area to park.
   b. Reduce the engine speed by releasing the accelerator pedal.
   c. Apply the hill hold pedal to hold the loader stationary.
   d. Place the high/low idle switch to low idle.
   e. Move the directional control lever to the neutral position.
   f. Activate the park brakes.
   g. Lower the bucket to the ground and apply slight pressure.
   h. Perform engine shut down procedures if necessary. Shut down procedures are given in OBJECTIVE 4-4.

FRONT END LOADER PRODUCTION OPERATION

module 6



OBJECTIVE 6-1

The front end loader operator will demonstrate proper digging techniques.

KEYPOINTS/PROCEDURES

1. **Digging hard face**

   Follow these procedures for digging the hard face:

   a. Place the bucket level, just skimming the ground.

   b. Approach the work face slowly and straight on. Never ram into the face.

   c. Once the bucket starts to dig, put the hoist lever into the hoist position.

   d. Keep constant pressure on the accelerator so that the loader keeps moving forward. Do not spin the tires.

   e. As the bucket fills, pull the tilt control lever to the roll-back position and accelerate slowly. If the bucket stalls ease up on the accelerator until the bucket begins to move.

   f. Repeat the roll-back and acceleration procedures until the bucket is full.

   g. Remove any overhangs in the face.

   h. Watch for material sliding down.

   Cautions:

   Do not overfill the bucket past the spill guards. Do not spin the wheels or steer while loading the bucket. Always maintain a level working area.

2. **Digging stockpiles**

   The procedures for digging stockpiles is the same as digging the hard face except that the material is easier to dig.

   Caution:

   Approach the working face squarely in order to prevent tire damage and excessive strain on the bucket and boom.

OBJECTIVE 6-2

The front end loader operator must demonstrate the proper techniques for transporting material with the front end loader.

KEYPOINTS/PROCEDURES

1. Follow these procedures for transporting material with the front end loader:
   a. The travelway must be free of foreign material such as spill rock.
   b. Once the bucket is loaded keep it fully rolled-back.
   c. Carry the loaded bucket low to the ground for better visibility and loader stability.
   d. While travelling, stay away from the edges of the roads.
   e. Steer the loader smoothly to prevent any unwanted spillage.
   f. Keep the speed of the loader at a safe range.
   g. When transporting material on a grade, the bucket must always be facing uphill. When travelling downhill the loader should travel in reverse and when travelling uphill the loader should travel forward.

OBJECTIVE 6-3

The front end loader operator will demonstrate the proper procedures to position the truck for loading.

KEYPOINTS/PROCEDURES

1. Follow these procedures to position the truck for loading:
   a. Load the bucket.
   b. Hoist the load.
   c. Position the loader so that when the truck backs in, it is in a position for loading.
   d. Position the truck so that it is at an angle to the material being loaded. This reduces loader turning and travel.
   e. Leave enough room for the loader to maneouver.

OBJECTIVE 6-4

The front end loader operator will demonstrate the proper procedures to load the truck.

KEYPOINTS/PROCEDURES

1. Follow these procedures to load the truck:
   a. Keep the work area level and free of foreign material that can cause tire damage.
   b. Load the bucket.
   c. Hoist the load.
   d. Position the truck as given in OBJECTIVE 6-3.
   e. Load finer material first to act as a cushion for the coarser material.
   f. The first bucket load must be dumped over the rear wheels of the truck.
   g. Roll the bucket back sufficiently to clear the truck bay before reversing.
   h. Fill another bucket with material.
   i. Approach the truck at a safe ground speed.
   j. Do not hit the truck with the loader arms or wheels.
   k. Dump the bucket into the truck box and then reel the bucket back.
   l Build the load in the truck box uniformly.
   m. Always look behind before reversing.
   n. Do not overload the bucket because it causes unwanted spillage.
   o. Do not overload the truck.
   p. Keep in mind the wind direction when positioning the truck. The wind to the back ensures good visibility.

OBJECTIVE 6-5

The front end loader operator will demonstrate the proper procedures to feed a crusher or breaker station.

KEYPOINTS/PROCEDURES

1. Follow these procedures to feed a crusher or breaker station:
   a. Load the bucket.
   b. Keep the bucket low to the ground while transporting the material. Transporting material is given in OBJECTIVE 6-2.
   c. Raise the bucket to dump it into the crusher or breaker station.
   d. Feed the crusher or breaker station with only the designated material.
   e. Keep the roadway and dumping area clear of spilled material.
   f. The loader operator must dump in accordance with the crusher and breaker station light signs.

OBJECTIVE 6-6

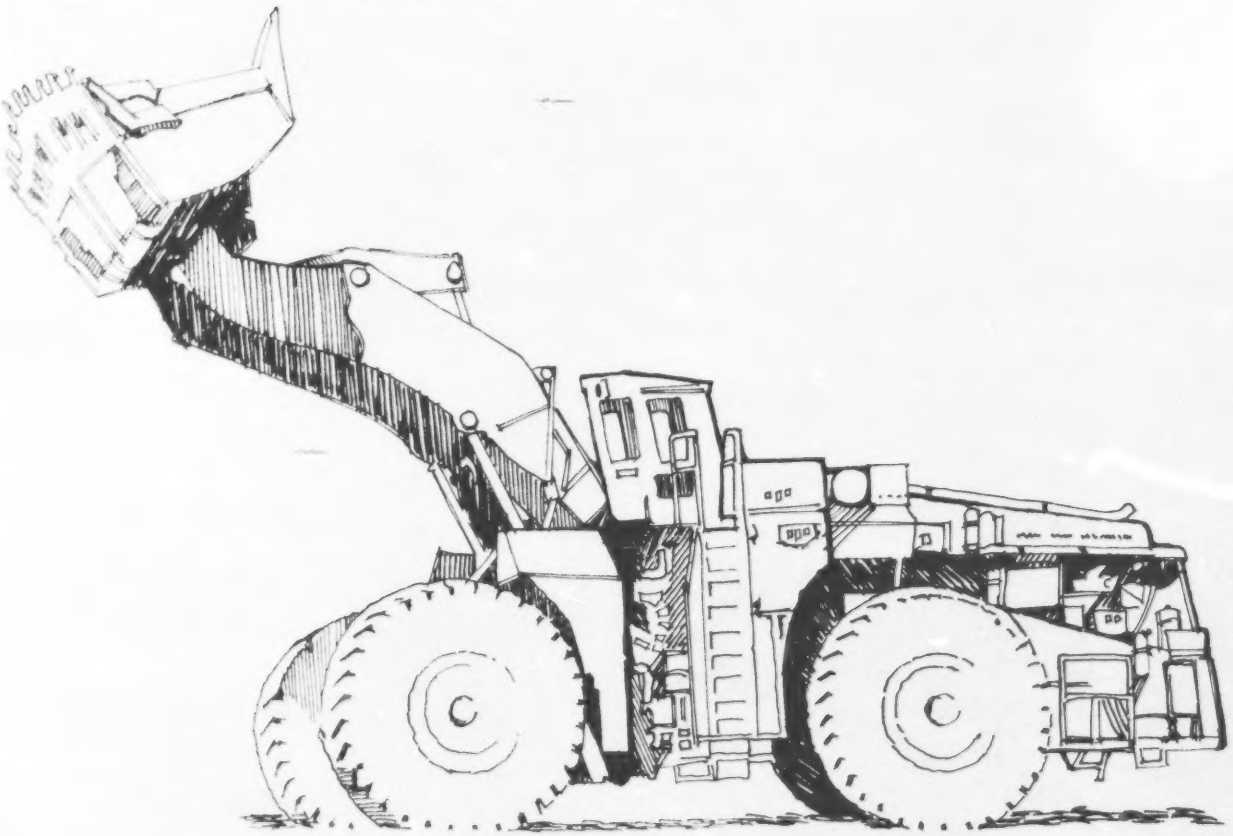
The front end loader operator will demonstrate the proper operating techniques necessary to avoid tire damage.

KEYPOINTS/PROCEDURES

1. Follow these procedures to avoid tire damage:
   a. Steer around foreign objects on the roadway. Never drive over unknown material.
   b. While digging, be sure to never spin the tires.
   c. While digging, do not apply excessive down pressure on the bucket to cause the front wheels to come off of the ground.
   d. While hoisting, never lift the back wheels off of the ground.
   e. Steer smoothly. Jerky or sharp turns cause unwanted tire damage.

SERVICE AND REFUEL

module 7



OBJECTIVE 7-1

The front end loader operator will demonstrate how to safely enter the lube and oil house area and explain all precautions to take.

KEYPOINTS/PROCEDURES

1. The front end loader operator, when entering the lub and oil house area, must be guided by a flag person. Follow these procedures:
   a. The bucket should be low to the ground and the loader should travel at very low speeds.
   b. Use extreme caution due to other equipment and personnel moving around the area.
   c. Keep one foot close to the service brake pedal in the event of an emergency stop.
2. While the front end loader is being serviced, the operator must climb down to the ground. Use the ladder and handrails when climbing down. Before leaving the cab follow these procedures:
   a. Apply the park brakes.
   b. Switch the high/low idle switch to low idle.
   c. Place the directional control lever into neutral.
   d. Lower the bucket to the ground and apply slight down pressure.
   e. Shut down the engine, if required.

Caution:

Never jump off of a front end loader.

OBJECTIVE 7-2

The front end loader operator will demonstrate the procedures for having the front end loader refuelled by a fuel truck and explain all precautions to take.

KEYPOINTS/PROCEDURES

1. If the company policy allows the front end loader to approach a fuel truck, the operator is to use extreme caution. Come alongside of the fuel truck at a very low speed, keeping the fuel truck and fuel truck operator in full view at all times.
2. Once the fuel truck driver has spotted the front end loader, the operator should:
   a. Apply the park brakes.
   b. Switch the high/low idle switch to low idle.
   c. Place the directional control lever into the neutral position.
   d. Lower the bucket to the ground and apply slight down pressure.
   e. Shut down the engine.
   f. Climb down from the cab to ground level using the ladder and handrails.
   g. After the refuelling and servicing is completed, the operator must walk around the front end loader to ensure that no one is in the area before starting up and going back to work.

Caution:

While being serviced in the pit area, front end loader operators must be aware of other equipment and personnel that can be in the vicinity of the loader.

OBJECTIVE 7-3

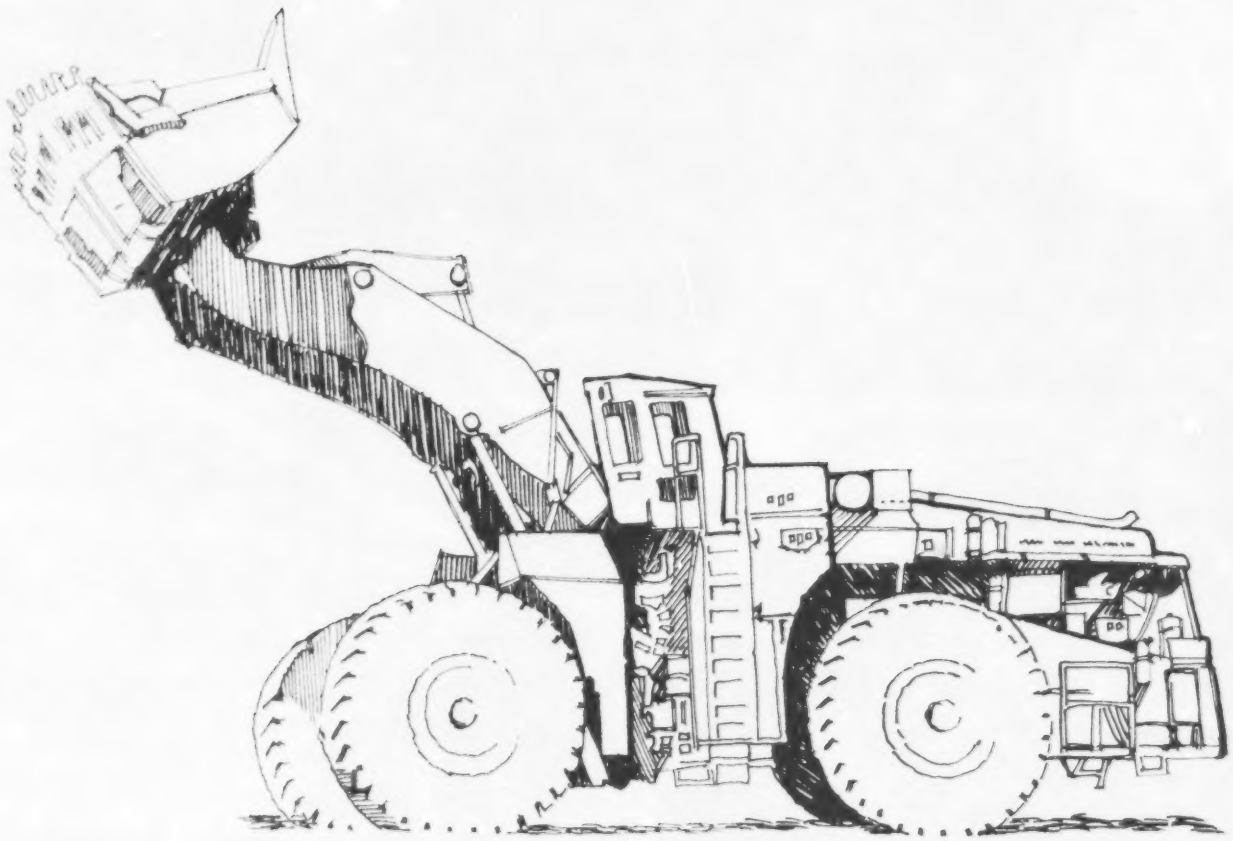
The front end loader operator will demonstrate the practices of good housekeeping on the front end loader and in the fuel and service areas, both in and out of the pit.

KEYPOINTS/PROCEDURES

1. The front end loader operator should follow these good housekeeping practices while on the loader.
   a. Clean all of the windows.
   b. Remove all rags, paper and dirt from the cab.
   c. Do not store any aerosol cans in the cab because there is the danger of an explosion.
   d. Keep all handrails and ladders free of grease. Grease can cause slips and falls.
2. Whenever possible, the operator should cleanup the service area while the front end loader is being serviced. For example:
   - Pick up all oily rags, paper, etc. and put them into a barrel for disposal.
   - Cleanup oil spills on the floor as soon as possible. Eliminate all possible hazards that can cause slips and falls.
3. Continually cleanup old rags, paper, etc. The refuel site usually changes with the pit situation.
4. Good housekeeping in the pit is just as important as in the service areas. Be aware of old rags and papers on the ground and pick them up and dispose of them properly during the refuelling operation.

SPECIAL ASSIGNMENTS

module 8



OBJECTIVE 8-1

The front end loader operator will cleanup spill rock to prevent tire damage to the rubber tire equipment.

KEYPOINTS/PROCEDURES

1. The front end loader operator must constantly be alert to spill rock off of trucks, metal objects and potholes. The operator should push foreign material off of the road while travelling.
2. In the work face area, the front end loader operator should be alert to spill rock from haulage trucks and shovel buckets. The loose material must be pushed back into the face.
3. Loose material left on dumps can be pushed over the edge or to the side so that haulage trucks do not travel over it.

OBJECTIVE 8-2

The front end loader operator will demonstrate the procedures used for cleaning up flyrock after a blast.

KEYPOINTS/PROCEDURES

1. Cleaning up after a blast with the front end loader is primarily a dozer operation using the bucket. Keep the bottom of the bucket low and parallel to the ground. When the material is pushed, some flyrock can enter the bucket, and is eventually dumped out into the face. The front end loader operator must deal primarily with flyrock that has landed on the haul roads and within the work areas. On the haul roads the flyrock is pushed off of the road.
2. The same procedure is used to cleanup road spill from haulage trucks in the work area or on the roads.

Caution:

Never push flyrock or any material with the bucket in the dump position.

OBJECTIVE 8-3

The front end loader operator will demonstrate the proper techniques for cleaning up the shovel area with the front end loader.

KEYPOINTS/PROCEDURES

1. Follow these procedures for cleaning up the shovel area with the front end loader:
   a. Ensure that the truck operators, shovel operators and ground personnel are aware of the front end loader's presence in the work area before starting to work. If radio contact cannot be made, enter the area on the cab side of the shovel, making visual contact with the shovel operator.
   b. With the bucket parallel and just skimming the ground, push all loose rocks and spill into the face, close enough so that the shovel can load it out.
   c. Do not push the material into the path or tracks of the shovel.
   d. The front end loader operator can assist in maintaining the proper grades by digging or filling in the shovel area.

Cautions:

Never enter the shovel counterweight swing radius. The operator should also be aware that the loader could still be within the bucket swing radius.

Never climb the face with the front end loader.

OBJECTIVE 8-4

The front end loader operator will demonstrate the proper techniques for cleaning and maintaining the crusher and breaker station ramps.

KEYPOINTS/PROCEDURES

1. Follow these procedures for cleaning and maintaining the crusher and breaker station ramps:
   a. Lower the bucket so that it is parallel to the ground and put slight down pressure on the bucket.
   b. Going forward, proceed up the ramp, pushing the material in front of the bucket. Some material will enter the bucket.
   c. Once the front end loader reaches the back stop on the crusher, the operator can use the back stop to hold the material, until the bucket is tilted back and the material loaded into it.
   d. Transport the material to the desired spot and dispose of it. Depending on the material it could be put into the crusher or breaker station.
2. The width of the ramp must always be considered. Make sure there is enough room to maneouver.

OBJECTIVE 8-5

The front end loader operator will demonstrate the proper techniques for removing large rocks and boulders from the crusher or breaker station.

KEYPOINTS/PROCEDURES

1. Follow these procedures for removing large rocks or boulders from the crusher or breaker station:
   a. Secure slings around the large boulder or rock.
   b. Guide the loader into position.
   c. Hook up the slings to the bucket so that they will not slip off. No one should work under a raised bucket while hooking up.
   d. Have a designated person give the proper signals to lift the boulder from the crusher.
   e. Once the boulder is removed from the crusher, lower the bucket and remove the slings from the boulder.
   f. Pick up the boulder with the bucket and transport it to the designated area.

OBJECTIVE 8-6

The front end loader operator will demonstrate the proper techniques for building a safety berm.

KEYPOINTS/PROCEDURES

1. Follow these procedures to build a safety berm:
   a. Use the last row of loads on the outside of the dump to construct the safety berm.
   b. The safety berm should be high enough and thick enough to hold a haulage truck from going over.
   c. The material must be stable. Do not use mud or snow.
   d. Ensure that the dump surface has a slight incline to the outside edge.
   e. Taper the berm towards the top. The tapering is accomplished by pushing and lifting the material as the loader moves forward.
   f. Lift the bucket to the desired berm height, then move the machine forward and push the excess material over the edge.
   g. Start from the right side of the dump and work to the left. The front end loader must be in full view of the trucks. If the dump is plugged, start from the left and work to the right.
2. The same procedure is used to build berms on haul roads, except for the slight incline to the outside edge.

Caution:

Use extreme caution when building safety berms on dumps and haul roads.

OBJECTIVE 8-7

The front end loader operator will demonstrate the proper techniques to push a dump.

KEYPOINTS/PROCEDURES

1. Follow these procedures to push a dump:
   a. Start from the left side and work to the right. The front end loader should be in full view of trucks that are hauling to the dump.
   b. Start with a small cut.
   c. As the front end loader pushes towards the edge make a slight incline towards the edge.
   d. Make a series of pushes and keep loading the bucket and dumping it until the outside edge is reached.
   e. Once near the outside edge, follow the procedures given in OBJECTIVE 8-6 to finish the job.

OBJECTIVE 8-8

The front end loader operator will demonstrate the proper procedures for moving cable stands and boats with the front end loader.

KEYPOINTS/PROCEDURES

1. Follow these procedures for moving cable stands and boats:
   a. Always push against the base of the cable stand which is usually a rubber tire filled with concrete. Do not rest the bucket on top of the base and push against the steel pipe which holds the pole. Never bang the base to get it moving. Push the standard at a slow and even speed.
   b. Use extreme caution when moving the cable stands. Make sure all personnel are away from the stand before moving.
   c. Cable boats should be dragged behind the front end loader, not pushed. When hooking up the boat to the front end loader make sure that it is securely fastened. Movement should be at a slow even speed.
   d. A ground man should be used whenever possible.

Caution:

Cable boats swing from side to side when being pulled. Use extreme caution when working around them. Follow safety clearance standards when moving cable stands and boats under overhead power lines and power cables.

OBJECTIVE 8-9

The front end loader operator will demonstrate the proper procedures for sanding roads with the front end loader.

KEYPOINTS/PROCEDURES

1. Follow these procedures for sanding roads:
   a. Load the bucket with the material to be used for sanding the road.
   b. Travel at low speeds when sanding.
   c. Keep the bucket just high enough so that the bucket can be dumped without touching the road. It can be hard to judge how much material is actually being spread.
   d. Spread enough material to ensure safe travel for the loader or other equipment.
   e. The operator can continue moving the tilt control lever back and forth to ensure an even flow of material out of the bucket.

OBJECTIVE 8-10

The front end loader operator will demonstrate the proper procedures for towing equipment with the front end loader.

KEYPOINTS/PROCEDURES

1. Follow these procedures for towing equipment:
   a. Safety and planning are the keys to moving equipment. Prepare the piece of equipment for towing so that it can be done safely.
   b. Hook up the tow bars or slings.
   c. Secure the safety lines.
   d. Make sure that all personnel are clear of the front end loader and the equipment to be towed.
   e. Always use a ground or signal person.
   f. Keep the bucket low to the ground when pulling. Pull at slow speed.

   Caution:

   Take extreme caution when towing equipment.

Province of
British Columbia

OPEN PIT MINING JO
FRONT END LOA
SKILL PROF

BASIC SAFETY AND OPERATING RULES	EXPLAIN THE IMPORTANCE OF SAFETY AND OPERATING RULES	EXPLAIN THE IMPORTANCE OF REPORTING ACCIDENTS AND INJURIES	EXPLAIN THE IMPORTANCE OF STAYING ALERT TO CHANGING CONDITIONS	EXPLAIN THE COMPANY TRAFFIC CONTROL SCHEME	EXPLAIN HOW TO AVOID TIRE DAMAGE	
	EXPLAIN THE COMPANY'S POWER CABLE HANDLING POLICY	EXPLAIN THE COMPANY'S LOCK-OUT PROCEDURES				
COMMUNICATIONS	SEND AND RECEIVE SIGNALS	FILL OUT REPORT FORMS	OPERATE THE MOBILE RADIO	READ SURVEY STAKES		
GAUGES AND CONTROLS	LOCATE AND IDENTIFY THE GAUGES AND CONTROLS	DESCRIBE THE FUNCTION AND RANGE OF EACH GAUGE	DESCRIBE THE FUNCTION OF EACH CONTROL AND SWITCH	DESCRIBE THE WARNING SIGNALS AND EXPLAIN THE ACTION TO TAKE		
PRE-START AND OPERATIONAL CHECKS	LOCATE AND IDENTIFY THE BASIC UNITS AND RELATED COMPONENTS	LOCATE IN SEQUENCE THE PRE-START AND OPERATIONAL CHECK POINTS	PERFORM A PRE-START CHECK	PERFORM THE ENGINE START UP AND SHUT DOWN PROCEDURES	PERFORM OPERATIONAL CHECKS	
BASIC OPERATION	MOVE THE FRONT END LOADER FORWARD	REVERSE THE FRONT END LOADER	CHANGE THE DIRECTION OF TRAVEL	STEER THE FRONT END LOADER	STOP AND PARK THE FRONT END LOADER	
FRONT END LOADER PRODUCTION OPERATION	PERFORM DIGGING	TRANSPORT MATERIAL WITH THE FRONT END LOADER	POSITION THE TRUCK	LOAD THE TRUCK	FEED THE CRUSHER OR BREAKER STATION	
SERVICE AND REFUEL	ENTER THE LUBE AND OIL HOUSE AREA	REFUEL THE FRONT END LOADER	PRACTISE GOOD HOUSEKEEPING			
SPECIAL ASSIGNMENTS	CLEANUP SPILL ROCK	CLEANUP FLYROCK AFTER A BLAST	CLEAN THE SHOVEL AREA	CLEAN THE CRUSHER OR BREAKER STATION RAMP	REMOVE OVERSIZE BOULDERS AT THE CRUSHER OR BREAKER STATION	

JOB TRAINING SERIES
OADER OPERATOR
OFILE CHART

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Ministry of Education
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EXPLAIN NORMAL BRAKING TECHNIQUES	EXPLAIN EMERGENCY STEERING AND BRAKING PROCEDURES	EXPLAIN THE IMPORTANCE OF GOOD HOUSEKEEPING	EXPLAIN THE COMPANY BLASTING AND GUARDING PROCEDURES	DESCRIBE THE BASIC LAYOUT OF THE PIT AREA	EXPLAIN THE USE OF FIRE SUPPRESSION SYSTEMS AND FIRE EXTINGUISHERS	DESCRIBE MISS-HOLES AND MISS-HOLE REPORTING PROCEDURES
DESCRIBE THE PROCEDURES FOR A COLD WEATHER START OPTIONAL SECTION)						
OPERATE TO AVOID TIRE DAMAGE						
BUILD SAFETY BERMS	PUSH A DUMP	MOVE CABLE STANDS AND BOATS	SAND ROADS	TOW EQUIPMENT		

THE DACUM APPROACH

DACUM is a systematic model of program development used in designing career, technical and vocational training programs. The first step in the process is to establish the skills expected of a graduate entering employment. These skills are generally specified by a representative employer group in a workshop conducted by program development specialists. The product of this activity is a skill profile chart. This chart is then circulated both to the participants and to a number of other employers for review prior to further development.

The next step is to specify learner-centred performance objectives. These include not only the skills a learner must demonstrate but also the conditions under which the skill is to be performed and the criteria used to determine the acceptable standard of performance.

Once the performance objectives have been set, there are three important steps to complete the development process. These are generally undertaken by an instructor or group of instructors, in the following order:

1) Appropriate evaluation instruments are chosen or created to assess student capability in relation to the specific objectives of the program.

2) A variety of suitable instructional techniques and learning experiences are chosen to facilitate learning of the skills and knowledge required to meet the objectives.

3) Instructional resources (texts, films, models, and other learning aids) are selected or created.

READING THE SKILL PROFILE CHART

A skill profile chart (often referred to as a DACUM Chart), is a graphic representation of the essential skills expected of a student graduating from a specific career, vocational or technical program.

Broad areas of employee responsibility are shown in the boxes on the left of the chart. These are called "general areas of competence". The tasks or skills related to each are sequenced along the horizontal track to the right of the general area of competence.

FOR FURTHER INFORMATION

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ADDITIONAL COPIES

Additional copies of this chart and performance objectives may be ordered from:

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